

SYSTEM AND METHOD FOR REGULATING WEB SITE ACCESS
CROSS-REFERENCE TO RELATED APPLICATIONS

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This patent application claims priority from
5 Provisional patent application Serial No. 60/217,595,
filed on July 11, 2000 and entitled "Internet Take-a-
Number Service". This patent application is related to
U.S. Patent Application serial no. _____, (Atty.
Docket No. 57983.000027, Client Reference No. 13848RO)
10 , entitled "Technique for Adaptively Controlling the
Admission of Web Server Requests" and in U.S. Patent
Application Serial No. _____, (Atty. Docket No.
57983.000008, Client Reference No. 12671RO) entitled
"Technique for Adaptively Distributing Web Server
15 Requests." The aforementioned patent applications are
filed concurrently herewith and are hereby incorporated
by reference in their entirety.

FIELD OF THE INVENTION

The present invention relates generally to a system
20 and method for regulating web site access and, more
particularly, to a system and method for regulating

website access in order to improve upon customer service and prevent web sites from failing due to excessive volume.

BACKGROUND OF THE INVENTION

5 In recent years, many e-commerce businesses have suffered from managing the problem of success. The growth of e-commerce has caused web site proprietors to have frequent occasion to reevaluate their hardware and software needs for their web sites. Frequently, a web
10 site proprietor faces the realization that an initial amount of software and hardware allocated to a web site is insufficient to accommodate a number of concurrent users accessing the web site (*i.e.*, the "load" on the web site). Additionally, response times for accessing the
15 web site, performing certain activities within the web site, and retrieving desired information from the web site may become so slow that a user of the web site exits the web site due to the slow response time. On extreme overload conditions, some customers will receive "server
20 not available" errors and will not be able to get access. It is additionally possible that customers could be

dropped in the middle of a transaction. Ultimately, the entire web site could fail under the load. Examples of sites experiencing overload problems include Amazon.com and Barnes & Noble, which experienced overload during the
5 release of the new Stephen King novel. Additionally, the Victoria's Secret web site failed completely during its first fashion show.

Web site proprietors, such as Internet "start-up companies," are initially uncertain as to the loads their
10 web sites will be required to handle. Such web sites may initially be developed on a small scale, and the web site proprietors may have an intention of expanding the web sites in the future. However, if a web site is selling products or services which are in great demand or the web
15 site offers incentives to users who access the web site in order to increase the number of users of the web site, or the web site is actively engaged in advertising and publicizing the products or services sold via the web site, the web site often ends up becoming quickly
20 overburdened by a large number of concurrent users. The proprietor of the web site may not be able to respond

quickly enough by adding hardware and software to the web site to address the large number of concurrent users.

Consequently, the web site may experience technical difficulties such as "crashes" or slow response times

5 because it was not designed to handle the traffic level loads. Such technical difficulties frequently cause consumer dissatisfaction. The web site proprietor may lose potential customers while trying to redesign the web site to meet the large volume of concurrent users.

10 In view of the foregoing, it would be desirable to provide a technique for managing web site traffic which overcomes the above-described inadequacies and shortcomings. In traditional businesses, companies are able to limit the number of customers they service
15 through limiting physical access to stores or placing customers on hold on phone lines. A system and/or method is needed to avoid web site technical difficulties, such as web site crashes and slow response times, among other difficulties, by limiting the number of concurrent users
20 that can access the web site and notifying customers that web site access is not currently available.

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SUMMARY OF THE INVENTION

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In accordance with the purposes of the invention as embodied and broadly described herein, there is provided an internet customer access system comprising a redirect
5 receiving unit for generating a request for a capacity determination of a web site. The system further comprises a capacity determination unit for determining if the web site has the capacity to handle an additional customer and a notification unit for notifying the
10 customer if the web site currently has insufficient capacity to accommodate additional customers. A redirect unit redirects the customer to the web site if sufficient capacity is found.

In a further aspect of the invention, an internet
15 customer access system is provided comprising a capacity determination unit for determining if the web site has the capacity to handle an additional customer and a scheduling processor for scheduling access of the customer to the web site if the capacity determination
20 unit indicates that no current capacity exists. A

customer identification unit is provided for determining whether a customer has scheduled access to the web site.

In an additional aspect, the invention comprises a method for regulating access to a web site. The method
5 comprises the steps of receiving a web site access request, determining whether the web site has sufficient capacity to accommodate a customer, redirecting the customer to the web site if sufficient capacity is found, and notifying the visitor if insufficient capacity is
10 found.

In yet a further aspect of the invention, a method for regulating access to a web site is provided. The method comprises the steps of determining if the web site has sufficient capacity to handle a customer, scheduling
15 access of the customer to the web site if insufficient capacity is found, and determining whether the customer has previously scheduled access to the web site.

These and other features, objects, and advantages of the preferred embodiments will become apparent when the
20 detailed description of the preferred embodiments is read in conjunction with the drawings attached hereto.

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The present invention will now be described in more detail with reference to exemplary embodiments thereof as shown in the appended drawings. While the present invention is described below with reference to preferred
5 embodiments, it should be understood that the present invention is not limited thereto. Those of ordinary skill in the art having access to the testings herein will recognize additional implementations, modifications, and embodiments, as well as other fields of use, which
10 are within the scope of the present invention as disclosed and claimed herein, and with respect to which the present invention could be of significant utility.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to facilitate a fuller understanding of the
15 present invention, reference is now made to the appended drawings. These drawings should not be construed as limiting the present invention, but are intended to be exemplary only.

Figure 1 is a block diagram illustrating the
20 environment of an incoming traffic control system for regulating web site traffic;

Figure 2 is a block diagram illustrating the components of an embodiment the incoming traffic control system for regulating web site traffic;

Figure 3 is a flow chart illustrating an embodiment
5 of the method for regulating web site traffic;

Figure 4 is a flow chart illustrating the sub-steps involved in a redirect procedure of the method for regulating web site traffic;

Figure 5 is a flow chart illustrating a first
10 embodiment of performing scheduling operations;

Figure 6 is a flow chart illustrating a second embodiment of performing scheduling operations;

Figure 7 is a flow chart illustrating a first embodiment of performing update processing;

15 Figure 8 is a flow chart illustrating a second embodiment of performing update operations;

Figure 9 is a flow chart illustrating an alternative embodiment of a method for regulating web site traffic;
and

20 Figure 10 is a flow chart illustrating the redirect procedures for the embodiment of Figure 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings in which
5 like reference numerals refer to corresponding elements.

Figure 1 is a block diagram illustrating an embodiment of the system for controlling incoming traffic to a web site. The incoming traffic regulating system 100 interacts with a web site 200, a name server 300, and
10 a customer system 400 through the use of a network 500 such as the Internet.

The customer system 400 may be or include, for instance, a personal computer running the Microsoft Windows™ 95, 98, Millenium™, NT™, or 2000, Windows™CE™,
15 PalmOS™, Unix, Linux, Solaris™, OS/2™, BeOS™, MacOS™ or other operating system or platform. Customer 400 may include a microprocessor such as an Intel x86-based device, a Motorola 68K or PowerPC™ device, a MIPS, Hewlett-Packard Precision™, or Digital Equipment Corp.
20 Alpha™ RISC processor, a microcontroller or other general or special purpose device operating under programmed

control. Customer system 400 may furthermore include
electronic memory such as RAM (random access memory) or
EPROM (electronically programmable read only memory),
storage such as a hard drive, CDROM or rewritable CDROM
5 or other magnetic, optical or other media, and other
associated components connected over an electronic bus,
as will be appreciated by persons skilled in the art.

The server 300 may be or include, for instance, a
workstation running the Microsoft Windows™ NT™, Windows™
10 2000, Unix, Linux, Xenix, IBM AIX™, Hewlett-Packard UX™,
Novell Netware™, Sun Microsystems Solaris™, OS/2™, BeOS™,
Mach, Apache, OpenStep™ or other operating system or
platform.

The traffic regulating system 100 and the web site
15 200 exchange status information on the ability for the
web site 200 to handle new loads as illustrated by path
1. When the customer system 400 attempts to access the
web site 200 and connects to the name server 300 as shown
by path 2, the name server 300 directs the request to the
20 traffic regulating system 100 instead of the actual web
site 200 as shown by path 3. Through the exchange of

information between the traffic regulating system 100 and the web site 200, the traffic regulating system 100 determines whether the web site 200 has the capacity to handle an additional customer. This exchange of

5 information can occur in two different ways. In the first case, the traffic regulating system 100 queries the web site 200 for capacity information upon receiving each request. In the second case, the traffic regulating system 100 queries the web site 200 at predetermined

10 intervals. In the latter case, when a request for a capacity determination is received, the decision as to whether capacity is available is made based on the result of the most recent query. If the web site 200 has the capability to handle an additional customer 400, the

15 customer system 400 is redirected to the web site as shown by paths 5 and 6.

As will further be explained in detail below, when the traffic regulating system 100 determines that insufficient capacity is available, it may attach an

20 encrypted tag to the customer system 400. When the customer system 400 attempts access again, the traffic

regulating system 100 locates the tag and removes it when
the customer system 400 is redirected to the web site 200
as shown by paths 4 and 5. If the web site 200 does not
have capacity to handle an additional customer 400 and
5 the customer 400 does not have a tag, the traffic
regulating system 100 displays a web page to the customer
system 400 via path 5. The web page informs the customer
system 400 of the lack of capacity and available options.
At this point, the customer system 400 is able to select
10 an option as will be further explained below. After
selecting an option, the customer is free to browse
elsewhere or go off line. If the web page provided to
the customer system 400 provides scheduling options and
the customer elects to schedule web site access, a tag is
15 attached to the customer system via paths 4 and 5. In a
preferred embodiment, the tag is an encrypted cookie.
The tag may also be an unencrypted cookie or any other
type of encrypted or unencrypted tag. Encryption can be
used to prevent intentional overloading. For instance,
20 if the tag is not encrypted, the customer might obtain
the tag and forward it to other customers for their use.

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A tag that is encrypted specifically to a customer system avoids reuse or sharing by unauthorized customers. When the customer system 400 again attempts to access the web site 200, the customer system 400 is redirected to the traffic regulating system 100 as explained above. The traffic regulating system 100 determines whether the customer system 400 has a valid or current tag. If the tag is valid, the customer system 400 is redirected immediately to the web site 200 via paths 5 and 6.

10 Figure 2 is block diagram illustrating the components of an embodiment of the traffic regulating system 100. The traffic regulating system 100 comprises standard components such as a memory 110 and an I/O interface 120. A processor 130 includes processing components including a redirect receiving unit 132 for receiving redirected customer requests from the network server 300 and requesting a capacity determination. The traffic regulating system 100 also includes a redirect unit 134 for redirecting the customer system 400 to the web site 200 when capacity is available as determined by a capacity determination unit 136. Available capacity

may be determined in any manner known to those skilled in the art and will depend upon the particular hardware and software configuration of the web site 200 as well as the desired response time for accommodating customers. A

- 5 notification unit 140 is provided for notifying customers if insufficient capacity is available. The notification unit 140 also has the capability to attach a tag to the customer system 400. The notification unit 140 includes a scheduling processor 142 and an update processor 144.
- 10 Embodiments of the scheduling processor 142 and the update processor 144 are further disclosed below. Finally, the traffic regulating system 100 additionally includes a customer identification unit 138 which is capable of discerning whether a customer system has been
- 15 provided with a tag.

Figure 3 is a flow chart illustrating a method for controlling incoming traffic to a web site in accordance with an embodiment of the invention. In step A10, a universal resource locator (URL) is received from the

20 customer system 400. In step A12, the network server 300 redirects the request to the traffic regulating system

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100. In step A14, the traffic regulating system 100 exchanges information with the web site 200 to determine whether the web site 200 has capacity. As set forth above, the exchange of information between the web site 5 200 and the customer system 400 can occur upon each request or at regular predetermined intervals. If the latter method is used, the capacity determination is based upon the most recent regularly scheduled inquiry. If it is determined that the web site 200 does have 10 sufficient capacity, the customer system 400 is redirected to the web site 200 in procedure B. Procedure B is further described below in conjunction with Figure 4. If the web site 200 has insufficient capacity, the traffic regulating system 100 determines in step A18 15 whether the customer has a tag. If the traffic regulating system 100 determines in step A18 that the customer does have a tag, the customer identification unit 138 of traffic regulating system 100, further inquires in step A20 whether the tag is valid. If the 20 tag is valid in step A20, the customer 400 is immediately redirected to the web site in procedure B. If in step

A18, the traffic regulating system 100 determines that the customer does not have a tag, scheduling operations are performed in accordance with procedure C. The embodiments of procedure C are further described below in
5 conjunction with Figures 5 and 6.

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10 Additionally, if in step A20, the tag is determined to be invalid, the system 100 determines whether the tag is expired in step A24. If the tag is determined to be expired in step A24, the traffic regulating system 100 performs scheduling operations C as indicated above according to the embodiment shown in Figures 5 or 6. If in step A24, the tag is not expired, the traffic regulating system 100 proceeds to procedure D to perform update processing. Update processing may be performed in
15 accordance with either of the embodiments shown in Figure 7 and 8 as will be further explained below. In step A28, the user may again request access by entering the URL of the web site 200.

Figure 4 is a flow chart illustrating the steps
20 involved in an embodiment of the redirect procedure. In step B10, the traffic regulating system 100 determines if

the customer system 400 has a tag. If the customer system 400 has a tag, the traffic regulating system 100 removes the tag in step B12. Otherwise, the customer system is sent directly to the web site 200 in step B14.

- 5 If the customer system 400 has a tag, the traffic regulating system 100 redirects the customer system 400 to the web site 200 upon removal of the tag.

Figure 5 illustrates a first embodiment of performing scheduling operations in accordance with
10 procedure C. As set forth above, scheduling operations may be performed when the web site 200 has insufficient capacity to handle additional customers. In step C10, the traffic regulating system 100 displays a web page to the customer 400. The web page indicates that the web
15 site is full, but that capacity will be available in the future. In step C12, the traffic regulating system 100, through the use of notification unit 140 provides the customer 400 with a position in a queue. In step C14, the notification unit 140 further provides the customer
20 400 with a estimated time at which the designated position in the queue will be reached. In step C16, the

notification unit 140 leaves a tag on the customer system
400 indicating that the customer system 400 has logged on
to the site and has been scheduled. In step C18, the
traffic regulating system 100 informs the customer that
5 access to the site will be valid for only a finite
specified time.

In accordance with the scheduling procedure shown in
Figure 5, update processing is performed as shown in
Figure 7. In particular, when the customer 400 again
10 attempts to log on to the system, if the customer has a
tag that is not yet valid, the notification unit 140
provides the customer 400 with updated queue information
in step D10. This updated queue information may comprise
an updated position and a new estimated time period. In
15 step D12, the system advises the customer to continue
browsing.

Alternative scheduling operations may be performed
in accordance with Figure 6. As shown in Figure 6, the
system 100 provides the customer with appointment slots
20 in step C110. Such slots would typically include divided
time periods such as 15 minute time spans in which the

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customer might access the web site 200. In step C112, if
the customer selects a slot, the traffic regulating
system 100 sets the appointment in step C114. In step
C116, the traffic regulating system 100 leaves a tag on
5 the customer system 400. In step C118, the traffic
regulating system 100 informs the customer 400 that the
tag is valid only for a specified time. If scheduling is
performed in accordance with Figure 6, update processing
will subsequently be performed in accordance with Figure
10 8 if the customer 400 attempts to access the web site
before the scheduled time period. In step D110, the
customer 400 is presented with the web page with
appointment information. In step D112, the customer 400
is offered the option to cancel or reschedule. In step
15 D114, if an operation is requested, the system performs
the cancellation or rescheduling operation in step D116.

In the embodiments Figs. 5 and 6, the customer 400
was provided with a tag for identification. In an
alternative embodiment each customer could be provided
20 with an alternative identifying mechanism such as a user
ID/password. In this instance, upon subsequent logon,

the traffic regulating system 100 would recognize the identifier and check the schedule.

Figures 9 and 10 illustrate an alternative embodiment of the invention in which a customer system attempts to access a web site having a temporary event. If a web site is broadcasting a live event which is limited to a duration of several hours or less, it is likely that it will not be practicable to reschedule access. However, as a service to the customer, a notification message indicating that web site capacity has been exceeded can be provided. Furthermore, it may be possible to provide replay options for interested customers. Accordingly, in Figure 9, the URL is received in step 210. In step 212, the network server 300 redirects the request to the traffic regulating system 100. In step 214, the traffic regulating system 100 determines whether the web site 200 has sufficient capacity to accommodate an additional customer. If the capacity is available, the customer is redirected to the web site 200 in step 218. If sufficient capacity is not available, the customer is informed in procedure E.

Figure 10 provides an embodiment of procedure E for informing the customer that the web site is full. In step E10, the traffic regulating system 100 displays a "site is full" or similar message. In step E12, the system 100 provides options to the customer for scheduling replay options. If a replay option is scheduled the traffic regulating system 100 leaves an encrypted cookie on the customer system 400 in step E14. As an alternative to the method shown in Figure 10, the customer system 400 could merely be provided with an indication that the site is full. In this instance, no tag would be left on the customer system 400.

The present invention is not to be limited in scope by the specific embodiments described herein. Indeed, various modifications of the present invention, in addition to those described herein, will be apparent to those of ordinary skill in the art from the foregoing description and accompanying drawings. Thus, such modifications are intended to fall within the scope of the following appended claims. Further, although the present invention has been described herein in the

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context of a particular implementation in a particular
environment for a particular purpose, those of ordinary
skill in the art will recognize that its usefulness is
not limited thereto and that the present invention can be
5 beneficially implemented in any number of environments
for any number of purposes. Accordingly, the claims set
forth below should be construed in view of the full
breadth and spirit of the present invention as disclosed
herein.

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